

Attachment 1-1-(a)-3



A DO-IT-YOURSELF GUIDE TO ENERGY STAR® HOME SEALING

SEALING AIR LEAKS AND ADDING ATTIC INSULATION



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United States Environmental
Protection Agency



Office of Air and Radiation
(6202J) EPA 430-F-04-024
November 2004



**ENERGY STAR
HOME SEALING**

EPA recommends sealing air leaks and adding insulation to make your home more comfortable, reduce energy bills, and help our environment.

Home Sealing is the quickest, cheapest way to a better performing home – and you can do it yourself.

Use This Guide To:

1. Learn how to find and seal hidden attic and basement air leaks
2. Determine if your attic insulation is adequate, and learn how to add more
3. Make sure your improvements are done safely and result in a healthier home
4. Reduce energy bills and help protect the environment

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When you see products or services with the ENERGY STAR, you know they meet strict energy efficiency guidelines set by the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE).

Since using less energy reduces greenhouse gas emissions and improves air quality, choosing ENERGY STAR is one way you can do your part to protect our planet for future generations.

For more information visit www.energystar.gov or call **1.888.STAR.YES** (1.888.782.7937)

LOCATING AIR LEAKS

Homeowners may be aware of air leaks around windows and doors, but often not the more significant leaks into the attic and basement. These are the leaks that raise your energy bill and make your house uncomfortable. In cold weather, air leaks in the attic act like a chimney, drafting expensive heated air up into your attic and sucking cold air in all around your home – through windows, doors and especially into the basement. Large gaps are often found around plumbing pipes, light fixtures, chimneys, and soffits and chaseways. Locating leaks can be difficult because they are often hiding under your insulation. (see illustration on page 1.3 to locate household air leaks).

Even if you have enough insulation in your attic, sealing attic air leaks will enhance the performance of your insulation and make for a much more comfortable home.

Effects of Air Leaks

- ➡ Cold outside air drawn into the house
➡ Heated inside air drawn into the attic

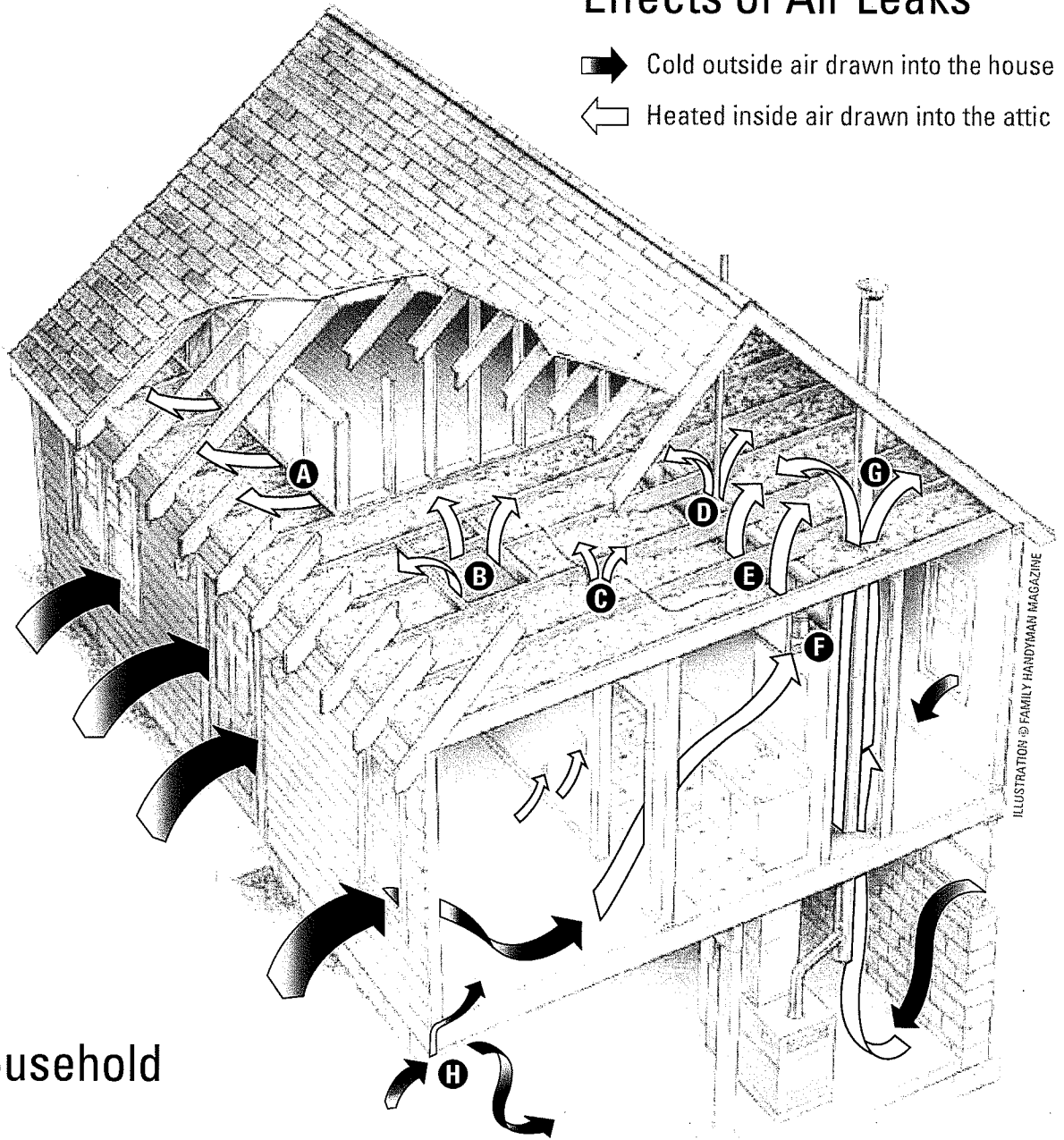


ILLUSTRATION © FAMILY HANDYMAN MAGAZINE

Common Household Air Leaks

- A** Between Floor Joists Behind Kneewalls
- B** Attic Hatch
- C** Wiring Holes
- D** Plumbing Vent
- E** Open Soffit (the box that hides recessed lights)
- F** Recessed Light
- G** Furnace Flue or Duct Chaseways (the hollow box or wall feature that hides ducts)
- H** Basement Rim Joist (where the foundation meets the wood framing)

You May Need A Contractor To Correct These Problems:

- Wet or damp insulation, which indicates a leaky roof, or from warm air from below coming into the attic and condensing on the cold attic ceiling.
- Kitchen or bathroom exhaust vent ducts that vent moist air into the attic instead of to the outside.
- A history of ice dams in the winter (an indication of serious air leaks).
- Little or no attic ventilation (see pg. 4.2 A Note About Attic Ventilation).
- Knob and tube wiring (pre-1930), which can be a fire hazard if in contact with insulation.
- Many recessed can lights in the attic floor (if not air tight, and uninsulated they require care when insulating around see pg. 2.2).

Inspect Your Attic

Attic air sealing and adding insulation are do-it-yourself projects if your attic is accessible and not too difficult to move around in. What we recommend in this guide can usually be completed in a day or two and will provide benefits for years to come. However, if upon inspection of your attic you find any of the conditions listed to the left, we recommend you consider hiring a contractor to correct these problems before proceeding.

For tips on hiring the right contractor, visit www.energystar.gov/homeimprovement

Get Your Bearings From Below

One way to start home sealing is to make a quick sketch of your home's floor plan. This sketch will help serve as a reference point once you get into the attic and will help you locate areas of leakage. In your sketch, make note of dropped soffits over kitchen cabinets or bath vanities, slanted ceilings over stairways, where walls (interior and exterior) meet the ceiling, and any other dropped-ceiling areas. These areas may have open stud cavities leading directly into the attic and are huge sources of air leaks (see photos 1 – 3 on pages 1.6 and 1.7).

Tips For Working In The Attic

▪ Have a Plan in Place

The key to any successful home improvement project is planning. Gather all your tools and supplies before you begin. This will minimize your trips in and out of the attic. Be sure that the work area is well lit by using a drop light and keeping a flashlight handy.

▪ Prepare to Get Dirty

The entire process of sealing your attic will be made easier if you take the time and effort to wear the right gear. Wear knee pads to help prevent pain associated with crawling on attic joists. Additionally, a lightweight disposable coverall, gloves and hat can keep itchy and irritating insulation off your skin.

▪ Above All – Be Safe

Take precautions to avoid a dangerous working environment in the attic. During hot weather start working early, as attics heat up as the day moves on. Drink plenty of water and use an OSHA-approved particulate respirator or double-strap dust mask to prevent inhalation of hazardous substances. Also remember to watch your step – walk on ceiling joists or truss chords, not your ceiling drywall.

Materials Checklist For Sealing Attic Air Leaks

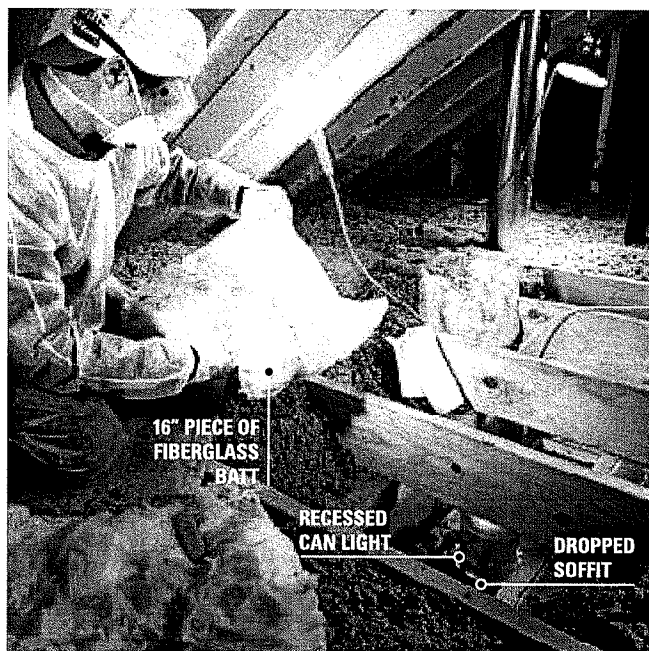
- | | |
|--|--|
| <input type="checkbox"/> Batt or roll of unfaced fiberglass insulation and large garbage bags (for stuffing open stud cavities behind kneewalls and in dropped soffits) | <input type="checkbox"/> Roll of 14-in. wide aluminum flashing to keep insulation away from flue pipe |
| <input type="checkbox"/> Roll of reflective foil insulation or other blocking material such as drywall or pieces of rigid foam insulation to cover soffits, open walls, and larger holes | <input type="checkbox"/> Retractable utility knife and sheet metal scissors |
| <input type="checkbox"/> Silicone or acrylic latex caulk & caulk gun for sealing small holes (1/4 inch or less) | <input type="checkbox"/> Tape measure and staple gun or hammer and nails to hold covering materials in place |
| <input type="checkbox"/> Several cans of expanding spray foam insulation for filling larger gaps (1/4 inch to 3 inches) | <input type="checkbox"/> Safety glasses, gloves and dust mask (for insulation work as well) |
| <input type="checkbox"/> Special high-temperature silicone caulk to seal around flues and chimneys | <input type="checkbox"/> Flashlight or portable safety light |
| | <input type="checkbox"/> Boards to walk on if needed |
| | <input type="checkbox"/> Large bucket to haul materials with |

SEALING ATTIC AIR LEAKS

Plug The Big Holes First

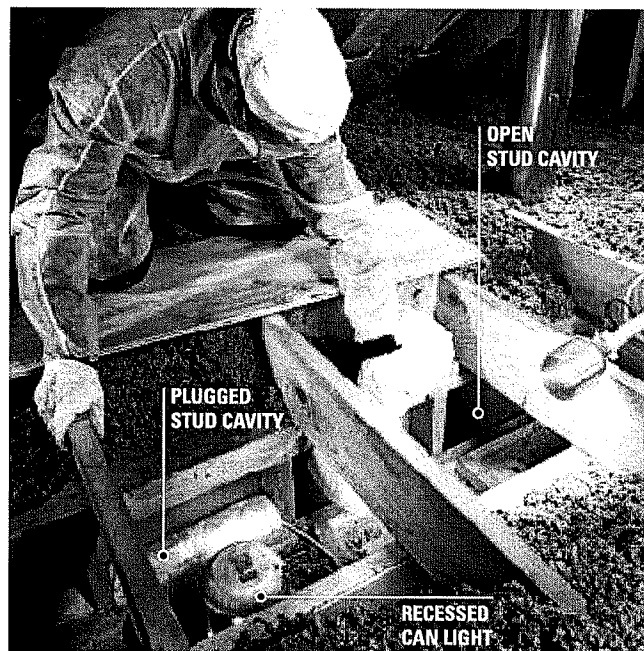
Don't worry about finding and sealing all the little holes in your attic, your biggest savings will come from plugging the large ones. Once in the attic, refer to your sketch to locate the areas where leakage is greatest (where your walls, interior and exterior, meet the attic floor, the soffits and other dropped-ceiling areas, and behind attic kneewalls). Look for dirty insulation – this indicates that air is moving through it. Soffits may be filled with insulation or covered with cardboard or fiberglass batts. Push back the insulation and scoop it out of the soffits. The insulation will go back over the soffit once the stud cavities have been plugged and the soffits covered (photos 1-3). (If you have recessed can lights in your open soffits, please read about them on page 2.2 before proceeding.)

1. CREATE STUFFED BAGS



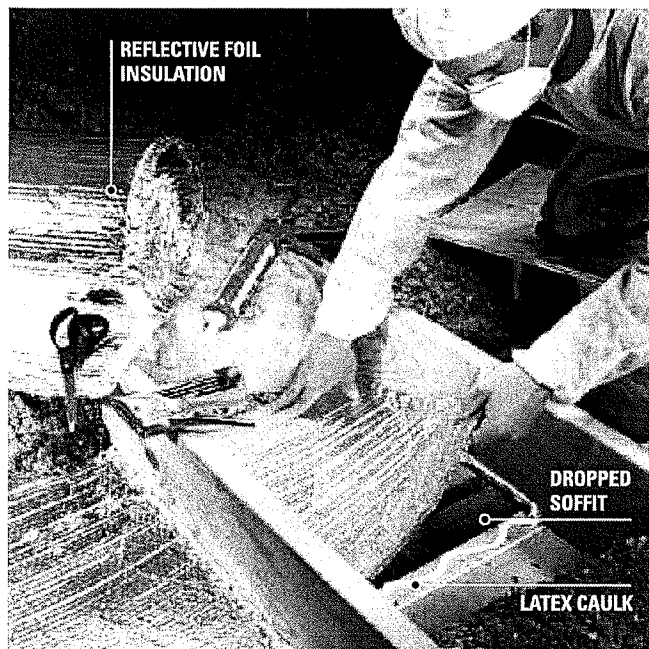
Cut a 16 in. long piece from a batt of unfaced fiberglass insulation and fold it at the bottom of a 13-gallon plastic garbage bag.

2. PLUG OPEN STUD CAVITIES



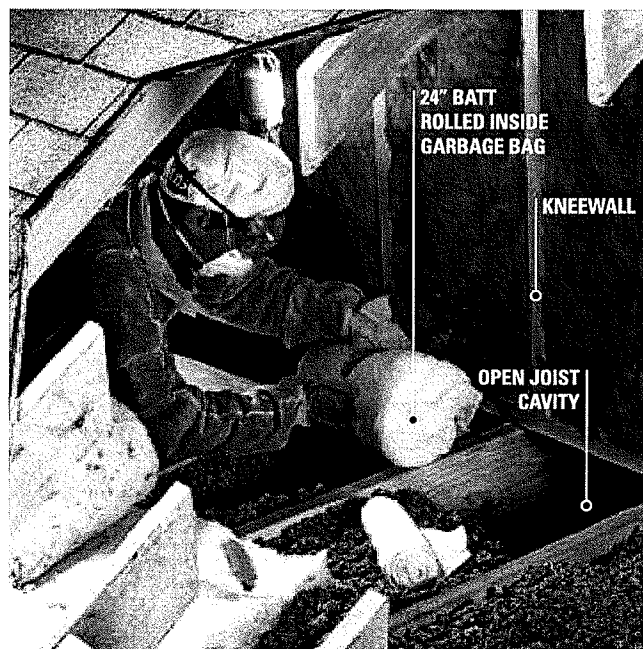
Fold the bag and stuff it into the open stud cavity. Add more insulation to the bag if it doesn't fit tightly. Plug all open stud spaces. Then cover the soffit (photo 3, pg. 1.7).

3. COVER SOFFITS & CHASEWAYS



Cut a length of reflective foil or other blocking material about 6 in. longer than the opening to be covered. Apply a bead of caulk around the opening. Embed the foil in the caulk and staple or nail it in place if needed. Then cover the area with insulation.

4. SEAL BEHIND KNEEWALLS



Cut a 24 in. long piece from a batt of fiberglass insulation and place it at the bottom of a 13-gallon plastic garbage bag. Fold the bag over and stuff it into the open joist spaces under the wall. Again, cover with insulation when you're done.

If You Have A Finished Attic, Seal Behind The Kneewalls

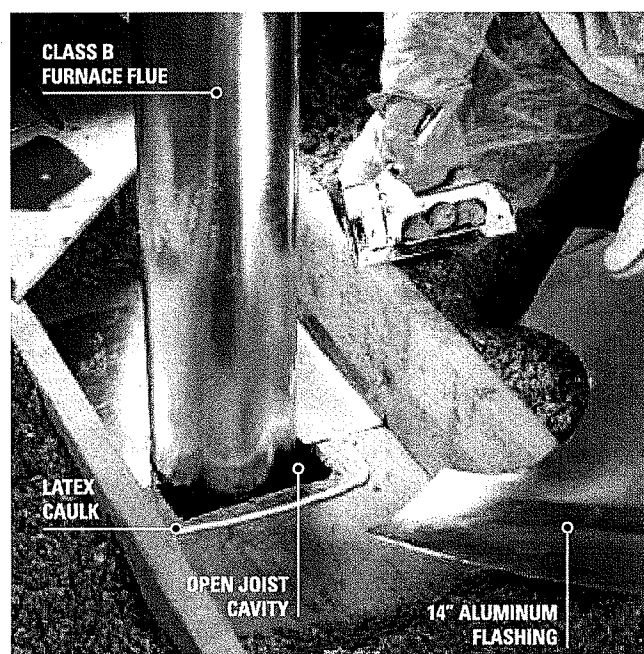
Finished rooms built into attics often have open cavities in the floor framing under the side-walls or kneewalls. Even though insulation may be piled against or stuffed into these spaces, they can still leak air. Again look for signs of dirty insulation to indicate air is moving through. You need to plug these cavities in order to stop air from traveling under the floor of the finished space (photo 4).

Caution: Some attics have vermiculite insulation, which may contain asbestos, a health hazard. Vermiculite is a lightweight, pea-size, flaky gray mineral. Don't disturb vermiculite insulation unless you've had it tested by an approved lab to be sure it doesn't contain asbestos. Contact your local health department for the name of an approved lab.

Furnace Flues Require Special Sealing Techniques

The opening around a furnace or water heater flue or chimney is a major source of warm air into the attic. Because the pipe gets hot, building codes require 1 in. of clearance from metal flues (2 in. from masonry chimneys) to any combustible material, including insulation. Photos 5 and 6 show how to seal this gap with lightweight aluminum flashing and special high-temperature silicone caulk. Before you push the insulation back into place, build a metal dam (photo 7) to keep it away from the pipe. Use this same technique for masonry chimneys.

5. CUT ALUMINUM FLASHING



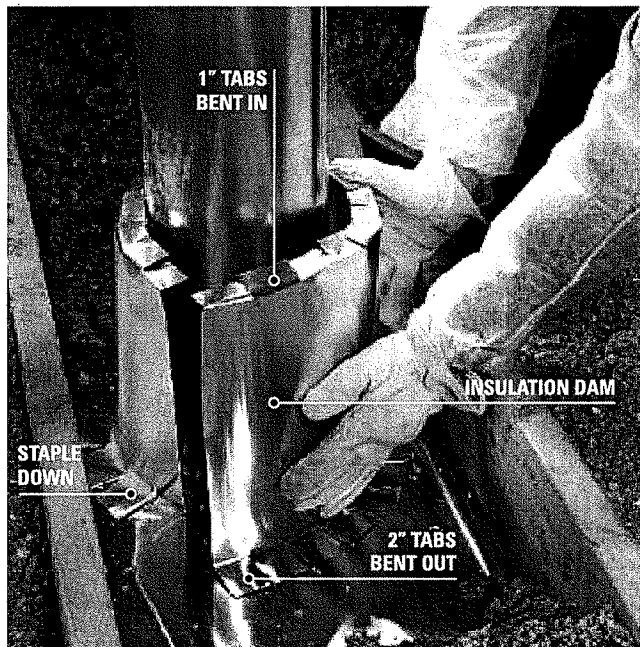
Cut aluminum flashing to fit around the flue. For round flues, cut half circles out of two pieces so they overlap about 3 in. in the middle. Press the flashing metal into a bead of latex caulk and staple or nail it into place. If there's no wood, staple or nail it directly to the drywall, but be sure not to go through the drywall.

6. SEAL WITH SILICONE CAULK



Seal the gap between the flue and metal flashing with special high-temperature silicone caulk. Don't use spray foam.

7. FORM AN INSULATION DAM



Form an insulation dam to prevent insulation from contacting the flue pipe. Cut enough aluminum from the coil to wrap around the flue plus 6 in. Cut slots 1 in. deep and a few inches apart along the top and bend the tabs in. Cut slots about 2 in. deep along the bottom and bend out the tabs. Wrap the dam around the flue and secure the bottom by stapling through the tabs. Now put insulation back right up against the dam.

Identifying Attic Pipes

FLUES/VENTS/PIPES:	MADE OUT OF:	SEAL AROUND WITH:
Furnace/Water heater	Galvanized metal	Aluminum flashing and high-temperature silicone caulk
Chimney	Masonry	Aluminum flashing and high-temperature silicone caulk
Plumbing	Cast iron or PVC	Expanding foam or caulk depending on size of gap